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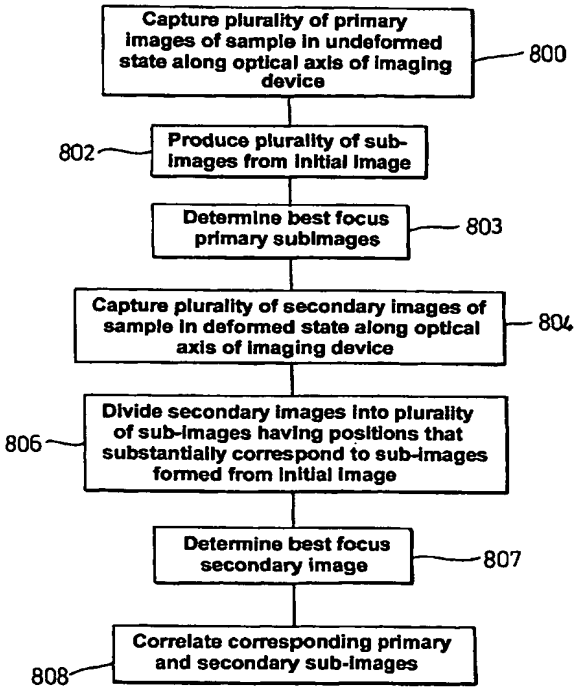
[Continued on next page]

(54) Title: MEASURING 3D DEFORMATIONS OF AN OBJECT BY COMPARING FOCUSING CONDITIONS FOR SHARP CAPTURING OF SAID OBJECT BEFORE AND AFTER DEFORMATION



(57) Abstract: An image analysis apparatus comprises a microscope (102) arranged to capture an image of a sample (122), a processor unit (114) arranged to process the image and a drive mechanism (108). The drive mechanism (108) varies the distance between the sample (122) and the microscope (102) along the optical axis of the microscope (102). The microscope (102) is arranged to capture a plurality of images (402a-404c) of the sample (122) at a plurality of focal planes (distances), along the optical axis. This is done for the sample in a first state and for the sample being in a second state (e.g. before and after deformation of the object). The processor unit (114) is arranged to divide each of the plurality of captured images (402a-404c) into a plurality of sub-images and select one of each of the plurality of sub-images having the best focus characteristics. Both sets of sub-images are compared to determine in-plane and out-of-plane deformations.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06T G01B G01C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	VOGEL D ET AL: "Microdac - a novel approach to measure in situ deformation fields of microscopic scale" MICROELECTRON. RELIAB. (UK), MICROELECTRONICS AND RELIABILITY, NO. 11/12, vol. 36, 8 October 1996 (1996-10-08) - 1996, pages 1939-1942, XP010528058 figures 1-4	12-15
Y	abstract page 1939, paragraph 3 page 1940, section "Principles of MicroDac"	1-3, 5-11,16, 17
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[X] Further documents are listed in the continuation of box C. [ ] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA	Authorized officer
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	ALLEGRO S ET AL: "Autofocus for automated microassembly under a microscope" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON IMAGE PROCESSING (ICIP) LAUSANNE, SEPT. 16 - 19, 1996, NEW YORK, IEEE, US, vol. 1, 16 September 1996 (1996-09-16), pages 677-680, XP010202748 ISBN: 0-7803-3259-8 page 677, left-hand column, paragraph 4 -page 678, left-hand column, last paragraph page 678, right-hand column, paragraph 3 - paragraph 4 page 678, right-hand column, paragraph 6 -page 679, left-hand column, paragraph 3 page 680, left-hand column, paragraph 3 ---	1-3, 5-11,16, 17
A	NAYAR S K ET AL: "SHAPE FROM FOCUS" IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, IEEE INC. NEW YORK, US, vol. 16, no. 8, 1 August 1994 (1994-08-01), pages 824-831, XP000464936 ISSN: 0162-8828 figures 3,8,9 page 825, left-hand column, paragraph 3 -page 826, left-hand column, paragraph 2 page 827, left-hand column, paragraphs 2,4 section "VII Automatic shape from focus system" page 829 -page 831 ---	1-17
A	NOGUCHI M ET AL: "Microscopic shape from focus using active illumination" PATTERN RECOGNITION, 1994. VOL. 1 - CONFERENCE A: COMPUTER VISION & IMAGE PROCESSING., PROCEEDINGS OF THE 12TH IAPR INTERNATIONAL CONFERENCE ON JERUSALEM, ISRAEL 9-13 OCT. 1994, LOS ALAMITOS, CA, USA,IEEE COMPUT. SOC, 9 October 1994 (1994-10-09), pages 147-152, XP010215958 ISBN: 0-8186-6265-4 abstract --- -/--	1-17

INTERNATIONAL SEARCH REPORT

PCT/GB 03/03052

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PITTER M C ET AL: "SUBPIXEL MICROSCOPIC DEFORMATION ANALYSIS USING CORRELATION AND ARTIFICIAL NEURAL NETWORKS" OPTICS EXPRESS, OPTICAL SOCIETY OF AMERICA, WASHINGTON, DC,, US, vol. 8, no. 6, 12 March 2001 (2001-03-12), pages 322-327, XP001166850 ISSN: 1094-4087 Abstract and Introduction	1-17